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Fungi of Cameroon 1. New corticioid species (*Basidiomycetes*)

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Abstract — Three new species of corticioid fungi *Phlebiopsis bicornis*, *Schizopora crassihypha* and *Steccherichium dimiticum* from the Mbalmayo Forest Reserve, Cameroon, are described, illustrated in detail and discussed.

Key words — resupinate fungi, systematics, novelties, tropical Africa

Introduction

Previous taxonomic studies on the Cameroon mycota have indicated a high diversity of aphyllophoroid fungi, especially species belonging to the group of corticioid fungi (Berthet & Boidin 1966, Boidin & Lanquetin 1973, Hjortstam et al. 1993, Roberts 2000, Roberts & Ryvarden 2006, Douanla-Meli 2007). The number of species of this group reported from Cameroon is less than 80 (Roberts 2000), thus many species await description. The study of macrofungal collections from the Mbalmayo Forest Reserve (MFR) has added several additional new reports of corticioid species for Cameroon (Douanla-Meli 2007). In this paper three new species are proposed based on the above-mentioned collections.

Materials and methods

The specimens examined were collected during three field trips in the MFR. The data relating to the ecology and environment of the site can be found in Douanla-Meli (2007). Microscopic features were studied from free-hand thin sections mounted in 5% KOH, Melzer's solution (MR+ = amyloid, MR– = nonamyloid). Observation and measurement were carried out at 1000× with bright field and phase contrast optics in light microscope (Olympus BX51TF). For SEM photographs, dried basidiospores were collected on platinum stubs and gold-coated to a thickness of 20 nm with a Balzers SCD 020 Coating Unit (Balzers, Liechtenstein), and then examined at 10 kV with a Hitachi S 4000 Scanning Electron Microscope. 30 randomly selected basidiospores were measured for each collection. Length-to-width ratios are noted as E, with Q

the arithmetic mean of E. Colour terms in parentheses are those of Kornerup & Wanscher (1978). Type materials are deposited at the herbarium of the University of Yaoundé I, Cameroon (HUYI) with isotype in O. Herbaria are cited according to Holmgren et al. (1990).

Phlebiopsis bicornis Douanla-Meli, **sp. nov.** Fig. 1

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Differt ab P. gigantea *et* P. roumeguerei *basidia bisterigmatica; Basidiosporae 4.5–7 × 3–4.5 µm, variabilis figurae, late ellipsoideae, paene oviformae vel paene nucleiformae.*

Holotypus: *Cameroon, Dept. Nyong & So'o, MFR, Oyack II, 04.X.2002, DMC 518 in HUYI, Isotypus in O.*

Etymology—referring to the bisterigmate basidia.

Basidiomata annual to perennial, resupinate, effused and often large, thin, in section up to 0.5 mm thick, ceraceous in the living state, and membranaceous-crustaceous when dry, whitish, pale yellowish (2A3) to cream (4A3), usually adnate but loosening from the substrata along the margins when dry; hymenial surface apparently smooth to the naked eye and somewhat tuberculose with scarce cracks under the hand lens, and velutinous owing to the numerous projecting metuloids; margins whitish, lighter than the centre part, thinning out, fimbriate to more or less fibrillose-determinate.

Hyphal system monomitic; generative hyphae 2–5 µm diam., without clamps, subhymenium thickening, not distinctly stratified, with strongly intricate, agglutinated hyphae and a high density of metuloid cystidia, hence the coriaceous to ceraceous texture; hyphae mostly thin- to slightly thick-walled; subiculum absent to hardly noticeable. Cystidia as numerous metuloids, (30–)40–100 × 12–18 µm, protruding up to 50 µm beyond the basidia, upper conical part richly encrusted with a crystalline coat up to two-fifths of the total length (but crystals lacking on some immersed cystidia), lower part cylindrical to ventricose, naked, walls up to 5 µm thick, hyaline to pale greenish yellowish (1A8). Basidia 15–23 × 4–5 µm, forming with numerous basidioles a densely agglutinated palisade, apically dilated, 2(–4)-spored, with 4-spored basidia very scarce, sterigmata at first stout becoming 2–5 µm long and undulate to arcuate, slightly projecting. Basidiospores 4.5–8 × 3–4.5 µm, E = 1.42–1.64, Q = 1.52, variable in shape, narrowly ellipsoid, pip-shaped, subovate, with adaxial side straight or somewhat concave, smooth, thin-walled and MR–.

Habitat and known distribution—On dead hardwood in lowland to premontane forest dominated by *Sterculiaceae* and *Ulmaceae*. So far only known from the type locality, MFR, Cameroon.

Comment—*Phlebiopsis bicornis* is characterized by its smooth to tuberculose, ceraceous, yellowish to cream basidiomata, abundant and large metuloid

Figure 1. *Phlebiopsis bicornis* (Holotype DMC 518).
a. Section through the basidiomata. b. Encrusted metuloid cystidia. c. Basidia. d. Basidiospores. Scale bar = 10 μm for b and 5 μm for a, c and d.

cystidia and agglutinated clampless hyphae. Within the genus, *P. bicornis* is morphologically related to *P. gigantea* (Fr.) Jülich and *P. roumeguerei* (Bres.) Jülich & Stalpers. Both species are European in distribution, have richly encrusted cystidia 60–90 μm long, and have oblong to narrow ellipsoid basidiospores of similar size range [(4.5–6(–8) × 2.5–3 μm and 4–5(–6) × 2.5–3 (–3.5) μm respectively]. They are separated by the subiculum texture, which is well developed in *P. gigantea* and scanty or lacking in *P. roumeguerei* (Eriksson et al. 1981). Two apparently similar Cameroon collections from Korup National Park, Watling 22788 and K(M) 64665 (not examined in this study) described as *Phlebiopsis* sp. (Hjortstam et al. 1993, Roberts 2000), are characterized by shorter, 30 × 10 μm, metuloid cystidia and smaller, 5 × 2.5 μm basidiospores, which suggest they are closely related to *P. galochroa* (Bres.) Hjortstam & Ryvarden. Another species closely related to *P. bicornis* is the pantropical *P. ravenelii* (Cooke) Hjortstam, which is also similar to *P. flavidoalba* (Cooke) Hjortstam. Both species were originally described from North America, but *P. flavidoalba* also has a neotropical distribution, and larger basidiospores [6.5–7(–7.5) × 3.5–3.75 μm] of *P. flavidoalba* help to distinguish it from *P. ravenelii* with smaller basidiospores (5–5.25 × 3.75–4 μm).

Steccherícium dimiticum Douanla-Meli, **sp. nov.** Figs. 2–3

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Differt ab St. seriatum *systemate hypharum dimitico; Gloeocystidia parva, (15–)20–60 × 5–9 µm, clavata vel cylindrica, saepe pseudoseptata, tenuitunicata vel crassitunicata.*

Holotypus: *Cameroon, Dept. Nyong & Soʼo, MFR, Ekombitie, 16.X.2002, DMC 410 in HUYI, Isotypus in O.*

Etymology—referring to the dimitic hyphal system.

Basidiomata annual, resupinate, effused-reflexed to subpileate, sessile and broadly attached; pileus semicircular, dimidiate, imbricate with lateral pilei fused, up to 6 cm long, up to 2.5 cm wide and 1–2.5 mm thick at the base; consistency tough to hard when dry; upper surface at first brownish (6D5) to orange-white (5A2), becoming greyish white (-B1) to cream (4A3) and mostly yellowish brown (5E8) towards the base when dry, adpressed tomentose, weakly concentrically sulcate, azonate; margins on effused parts thin, acute, fimbriate and always incurved when dry, rhizomorphs absent; hymenium odontioid to hydnoid, yellowish white (2A2) to cream (4A3), aculei crowded, 4–5 per mm, conical, 1–2 mm long, not fimbriate; subiculum or context soft corky, whitish to yellowish white (2A2), tough, up to 0.5 mm thick.

Hyphal system dimitic and tending to trimitic; generative hyphae clamped, hyaline, 1–2.5 µm diam., thin-walled and much branched in the subhymenium, 2.5–3 µm diam., thin- to slightly thick-walled, frequently branched and often with sprouting clamps in the aculeal trama, subiculum and context; skeletal hyphae 2.5–4 µm diam., thick-walled with large lumen, in the aculeal trama often with oily contents, hyaline, not dextrinoid, some branched and thickened hyphae resembling binding hyphae present in the context. Cystidia absent. Gloeocystidia numerous, variable in shape and size, 35–60 × 5–9 µm, cylindrical, straight to slightly flexuous, thin-walled, with short curved base, embedded in the subhymenial layer, projecting into the hymenium but rarely protruding; (15–)30–50 × 5–9 µm, clavate, club-shape to subcylindrical, thin to slightly thick-walled at the tubular to cylindrical end, at the base often curved and long-stalked (stalk 20–60 µm long up to the basal clamp), many with a few adventitious septa, contents oily, compact to finely granular, at times delimitating an obtuse to mucronate non-oily apex, embedded in the context and aculei trama. Basidia 12–15 × 3–4 µm, clavate to subcylindrical, 2–4-spored, sterigmata short and spine-like, with a basal clamp. Basidiospores 3–4 × 2.5–3 µm, E = 1.18–1.32, Q = 1.25, ellipsoid to oblong, hyaline, thin-walled, finely punctate and MR++.

Habitat and known distribution—On dead hardwood in lowland to premontane forest dominated by *Sterculiaceae* and *Ulmaceae*. So far only known from the type locality, MFR, Cameroon.

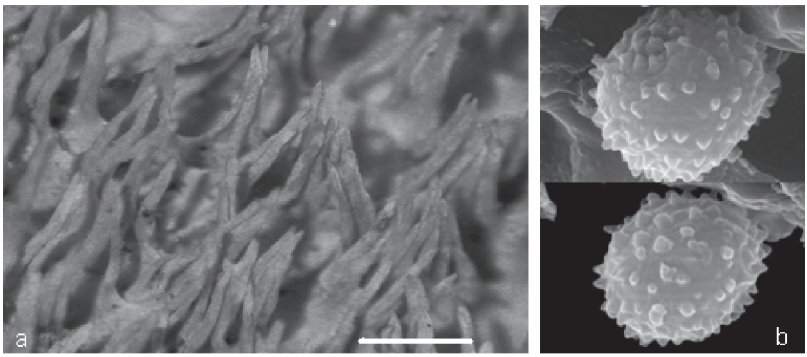

Figure 2. *Steccherícium dimiticum* (Holotype DMC 410).
a. Odontioid to hydnoid hymenial surface. b. SEM micrograph of basidiospores.
Scale bar = 2 mm for a and 2 μm for b.

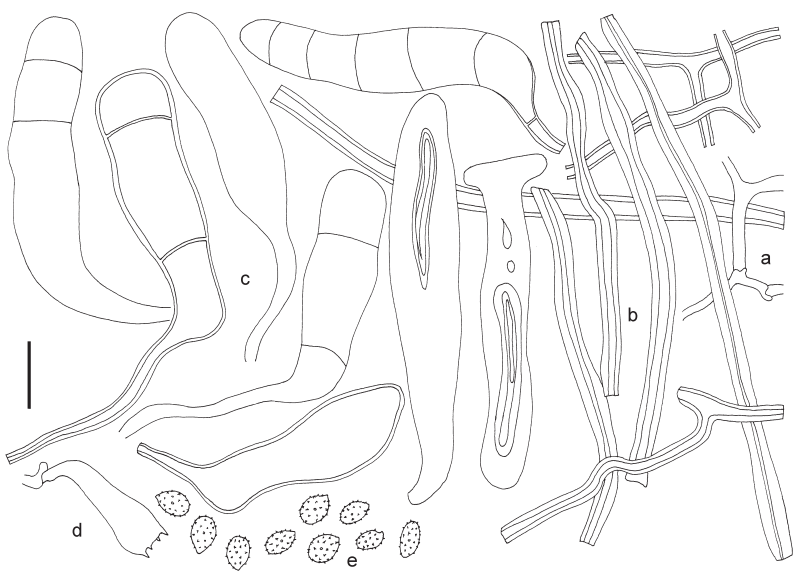

Figure 3. *Steccherícium dimiticum* (Holotype DMC 410).
a. Generative hyphae. b. Skeletal hyphae. c. Gloeocystidia. d. Basidia. e. Basidiospores.
Scale bar = 10 μm for a-d and 5 μm for e.

Additional specimen examined—CAMEROON. Centre Province, Dept. Nyong & So'o, MFR, Ekombitie, 47 km South east of Yaounde, 11° 54′ E, 3° 58′ N, alt. 500–650 m, 16.X.2002, DMC 411 in HUYI.

Comment—*Steccherícium dimiticum* is characterized by the pale basidiomata with odontioid (DMC 411) to hydnoid (DMC 410) hymenial surface, dimitic hyphal system, and gloeocystidia that have oily contents and are often

secondarily septate. A number of poroid species with a dimitic to trimitic hyphal system originally placed in *Steccherichium* D.A. Reid by Corner (1989) have been synonymized with *Wrightoporia* Pouzar (Stalpers 1996, Hattori 2003). This indicates the overlapping features between the two genera, such as the amyloid and ornamented basidiospores. Although species of *Wrightoporia* are dimitic, they are distinctly poroid, have dextrinoid tramal skeletal hyphae, and infrequently possess gloeocystidia (Gilbertson & Ryvarden 1987, Hattori 2003, Dai & Cui 2006). Despite its dimitic hyphal system, the new species is keyed out in *Steccherichium* on account of its odontioid hymenial surface. Among the five valid species in this genus (Index Fungorum 2004), *St. seriatum* (Lloyd) Maas Geest. is closely related to *St. dimiticum*. *St. seriatum* is characterized by the dull orange basidiomata, tubular gloeocystidia 50–100 µm long without adventitious septa, and ellipsoid to oblong, 3.5–4 × 2.5–3 µm basidiospores (Roberts 2000). Moreover, *St. seriatum* is typically monomitic, thus the combination of shorter and pseudoseptate gloeocystidia, and dimitic to trimitic hyphal system delimits *St. dimiticum*.

Schizopora crassihypha Douanla-Meli, **sp. nov.** Fig. 4

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Basidiomata annua, resupinata; consistentia coriacea; superficies hymenialis porifera vel radiato-fibrillosa. Systema hypharum dimitica. Hyphae generativae ramosae, fibulatae, tenuitunicatae vel crassitunicatae, hyphae sceleticae crassitunicatae. Basidiosporae 3–4 × 2.3–3 µm, paene globosae vel ellipsoidae.

***Holotypus**: Cameroon, Dept. Nyong & So'o, MFR, Oyack II, 24.IX.2002 DMC 519 in HUYI, Isotypus in O.*

Etymology—referring to the constantly thick-walled, generative hyphae.

Basidiomata annual, resupinate, thin, membranous, 100–250 µm thick, adnate, extensive, continuous but with intercalary depressions hollowed out of irregular areas; consistency coriaceous to hard when dry; hymenial surface poroid to rimose toward margin, whitish yellow (2A2) to cream (4A3); margin more or less fibrillose, whitish to yellowish white (2A2), without rhizomorphs; pores 5–7 per mm, mostly elongated up to 1 mm, often lacerate-denticulate; tubes concolorous, very shallow, up to 150 µm deep; context or subiculum fibrous, up to 100 µm thick, yellowish (2A3).

Hyphal system dimitic; generative hyphae 3–5 µm diam., clamped, hyaline, moderately thickened in subhymenium to distinctly thick-walled in subiculum, in subhymenium richly branched in acute to right angles with short segments, some hyphae covered with fine crystalline material; skeletal hyphae 3.5–6 µm diam., dominating in the subiculum, dense and perpendicularly arranged, straight or sinuous, hyaline, thick-walled, walls thinning toward the apices; few hyphal ends on the edges of dissepiments encrusted with fine granular crystals.

Figure 4. *Schizopora crassihypha* (Holotype DMC 519).
a. Section through the basidiomata. b. Tramal thick-walled skeletal hyphae.
c. Tramal thick-walled generative hyphae. d. Capitate cystidioid elements. e. Basidiospores.
Scale bar = 5 μm.

Cystidioid elements numerous as capitate hyphal ends in the hymenium and edges of dissepiments, 20–30 long, provided with a rounded cap 7–10 μm broad, lacking resinous apical material, slightly thick- to thick-walled on the narrow basal part and thin-walled upward or entirely thick-walled, not encrusted; fusiform cystidia present, 19–22 × 4–4.5 μm, ventricose toward the base and gradually effilate upward. Basidia (7–)12–16 × 4.5–6 μm, 2-spored, subcylindrical, clavate to suburniform, with a basal clamp. Basidiospores 3–4 × 2.3–3 μm, subglobose to broadly ellipsoid, hyaline, thin-walled, smooth and MR–, many basidiospores with either one or both ends strangulated into conspicuous papillae reminiscent of conidial formation, though no conidia were observed.

Habitat and known distribution—On dead wood and bark of sapeli, *Entandrophragma cylindricum* (Sprague) Sprague, in lowland to premontane forest dominated by *Sterculiaceae* and *Ulmaceae*. So far only known from the type locality, MFR, Cameroon.

Comment—The tough and poroid basidiomata, almost thick-walled generative hyphae and cystidioid elements consisting of inflated hyphal ends characterize *Schizopora crassihypha*. Some generic features like capitate cystidia with globular encrustation and suburniform basidia are lacking in *S. crassihypha*. Nevertheless the poroid hymenial surface and inflated or encrusted hyphal ends strongly suggest its placement in *Schizopora*. *Hyphodontia* J. Erikss. and *Schizopora* show significant morphological convergence and appear in a paraphyletic assemblage (Langer 1994, Binder et al. 2005). *Hyphodontia* species are basically monomitic, however, even the few poroid species (Wu 2000, 2001).

Among the seven valid *Schizopora* species (Index Fungorum 2004), the commonest species, *S. paradoxa* (Schrad.) Donk, is a close relative of *S. crassihypha*. *S. paradoxa* shows considerable variations in hymenial surface pattern, basidiospore size, and frequency of capitate cystidioles, which are linked to its geographical distribution (Ryvarden & Johansen 1980, Eriksson et al. 1984, Gilbertson & Ryvarden 1987, Quanten 1997, Douanla-Meli 2007). *S. paradoxa* shares with *S. flavipora* (Berk. & M.A. Curtis ex Cooke) Ryvarden relatively shallow pores, often splitting and becoming irpicoid to labyrinthine. In both cases the generative hyphae are typically thin to slightly thick-walled, always thin-walled in the subhymenium. Basidiospores are 3.5–5 × 2.5–3.5 µm in *S. flavipora* and rather broader, 4–6(–6.5) × 3.5–4 µm, in *S. paradoxa* (Eriksson et al. 1984, Douanla-Meli 2007).

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